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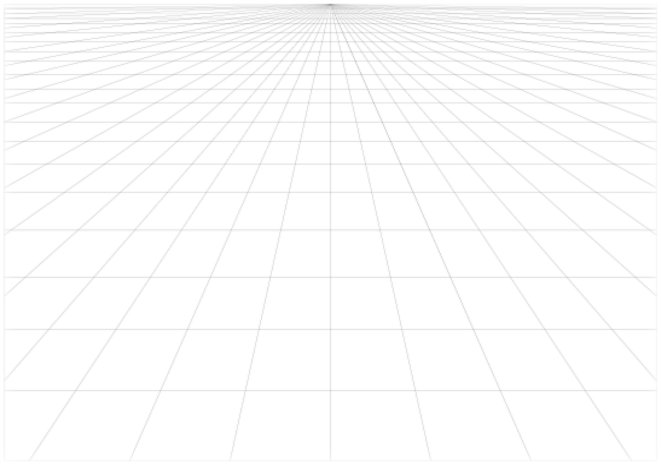
Innovations in the Power Utility Industry

External Knowledge purchase and absorptive capacity; the case of the Norwegian power utility company Statkraft



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Preface

This thesis is part of the Master in Society, Science, Technology in Europe at the University of Oslo. The study consists of two intensive semesters devoted to the study of science and technology in society, in both historical and contemporary perspectives. The programme aims to apply inter-disciplinary research to the social and economic analysis of innovation, to strategic decision-making, management of new technologies and to political analysis of modern science- and technology-based societies.

The thesis was supervised by Jarle Hildrum from the TIK centre at the University of Oslo; I would like to place a special gratitude to Jarle. His door was always open and his cell phone always on, thank you for the invaluable help and advice during this process.

I would also like to place a special gratitude to my contacts at Statkraft who included me in their internal process. To everyone at Statkraft who so kindly shared their knowledge and valuable time with me during this process, thank you!

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Abstract

This thesis builds on the theoretical framework developed by Cohen and Levinthal as well as Zahra and George and Jansen et al. on absorptive capacity to analyze the process of internalizing externally purchased knowledge in a power utility company. I interview employees about their R&D projects and the mechanisms involved in these knowledge transfer processes. I argue that the structure of the R&D organization can constrain or improve the firm's ability to fully exploit its combinative capabilities and thereby increasing its technology and knowledge transfer success rate. I made some interesting findings on the influence of organizational dimensions on managerial dimensions.

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Introduction

Knowledge transfer is influenced by a series of dimensions and firm specific antecedents, what these antecedents are and the strength of them are subject to an ongoing academic discourse. In my thesis I explore a Norwegian power utility company and antecedents for its ability to internalize new externally purchased knowledge. The study is focused on how well prepared companies are to create technological innovations when they are heavily relying on externally generated knowledge and technology.

My research question is: What facilitates and obstructs the internalization of externally purchased knowledge in a large power utility company?

The aim of this thesis is to bring insight in how power utility companies, who are relying heavily on externally generated knowledge and technology, can improve their internalization capabilities and their R&D effort to create technological innovations. These two aims are dependent on the firm's ability to identify, absorb and internalize new knowledge. The core literature of my thesis is based on the research from Wesley Cohen and David Levinthal (1989; 1990a; 1994) and Shaker Zahra and Gerard George (2002) on knowledge transfer and firms ability to absorb and utilize new knowledge. Cohen and Levinthal introduced a construct that described firm's ability to recognize, assimilate it and bring it to commercial ends. Later research has used this construct in research focusing on knowledge content and on knowledge similarities between learning partners (Mowery & Oxley, 1996). Research focusing on strategic, cultural and structural issues (P. Lane & Lubatkin, 1998; Szulanski, 1996), and on knowledge transfer focusing on organizational structure (Van den Bosch, Volberda, & De Boer, 1999). The construct was further developed by Shaker Zahra and Gerard George (2002). However, researchers have also focused on firm specific capabilities

and that absorptive capacity is dependent on how firms utilize these capabilities (Grant, 1996; Jansen, Van Den Bosch, & Volberda, 2005). In my thesis I aim at building on these theories and explore the affects the structure of the R&D organization has on absorptive capacity. Further I explore incentive systems as antecedent of absorptive capacity.

Energy will be one of the defining issues of this century. The sharp increase of the human population, the growth of the world economy and further shortage of energy resources are all strong incentives for research and development of new energy production technologies. How well we do it will define the future of our societies. This is also why energy is one of the worlds fastest growing industries of today (Fortune, 2009). The increased global focus on climate change and the need for clean energy sources has resulted in large investments in developing new clean energy technologies (REN21, 2007). Today, power utility companies that want to keep up in this rapidly growing industry needs to purchase and internalize complex new technology faster and better than the rest (S. A. Zahra, Sisodia, & Das, 1994). The most rapid growth of the industry has happened within the last decade, exploring the technology process involved within this sector would thus be limited. This makes the energy sector a relevant case for studies of knowledge and technology transfer.

Another defining issue of this century is information and the accessibility of it. Our society is overwhelmed with information; it's all theoretically just one click away. Bill Joy, the founder of Sun Microsystems, once said; "no matter who you are, most of the smartest people always work for someone else!" (Lakhani & Panetta, 2007). With this statement Bill Joy implies that no manager, employee or CEO should believe that they always know best how things ought to be. This statement has later been named Bill Joy's law on management. Sponsoring research institutes, research centres and universities, and further buying externally generated technological innovation has become the standard R&D strategy for many large power utility companies according to Executive Vice President in Wind Power and Technologies at the

Norwegian power utility firm Statkraft, Jon Brandsar. Flexibility and scope of choice increase. A company can choose among the best brains in the whole world instead of constraining itself to the brains within the boundaries of its own company, in line with Bills statement. Further, in this scenario the large extent of available knowledge gives firms with high absorptive capacity a competitive advantage. However, knowledge transfer and the process of learning meet new challenges when acquiring knowledge from external sources. To stay competitive in this rapid growing environment companies need to improve routines, systems and the structure of their R&D organization.

In the following section I present the theoretical framework used in my thesis starting with a clarification of some key concepts and definitions. This section will then be followed by a presentation of my research design where I also describe the methods and the process involved with developing this thesis. Before I present and analyze my empirical findings I describe my research object, Statkraft. Further, I discuss what implications my findings have on theory about knowledge transfer and absorptive capacity. I finish my thesis with a short conclusion, limitations of my study and some directions for future research.

Theoretical and Analytical Framework

In this chapter I will introduce the theoretical framework my thesis is based on, how the absorptive construct has evolved since it was first introduced and where the current theoretical discourse is.

The aim of my thesis is to bring further insight in factors obstructing and facilitating internalization of externally developed knowledge. By building further on the literature that uses the construct of absorptive capacity I explore the antecedents for this ability. The academic relevance and contribution my thesis aim for is to explore antecedents for the ability to absorb and internalize new externally purchase knowledge at a power utility company. I will present and describe relevant theory on knowledge transfer and internalization of externally purchased knowledge in companies existing products and processes. This broad theoretical section will be followed by a presentation of how and from where the construct of absorptive capacity originated. Further I will go in depth about how that construct has evolved and where the current debate is. I will also give a brief introduction to the research on strategic management, organization and R&D structure. The arguments about how these factors influence absorptive capacity will form the theoretical framework of my research.

The core literature I base my thesis on were selected by using ISI Web of Knowledge. The top six most cited articles when searching for “absorptive capacity” are all part of the core literature in this thesis. Further, I also include a more recently published article from the Academy of Management Journal which is one of the leading journals on absorptive capacity (P. J. Lane, Koka, & Pathak, 2006). The literature about knowledge transfer was selected using the same methods.

Concepts, definitions and delimitations

Considerable efforts has been made in defining what technology transfer is and also what all the concepts related to it are. Concepts and definition have been redefined and adjusted over time. To clarify the terminology I use in my thesis I present my understanding of the most important concepts used in my thesis.

The understanding of the word *knowledge* in this thesis includes explicit and tacit knowledge. At my research object most of the knowledge purchases are transferred as written documents or embedded in a technology. Nonetheless, the tacit knowledge dimension plays an active role in the knowledge transfer process. Knowledge transfer can incorporate a number of different dimensions. Technology transfer is one specific dimension of a knowledge transfer process. Internalization of knowledge is in this thesis understood as the process of making new knowledge an integrated part of the exciting knowledge of the firm, like routines, procedures and technology. The knowledge transfer process and the internalization of knowledge are dependent on the receiver's ability to absorb new knowledge. To measure this ability many researchers use the construct absorptive capacity. Although a knowledge transfer process consists of several phases I focus on the last phases and study the internalization phase of the knowledge.

Knowledge: Knowledge can be divided into two distinct dimension; *Tacit* and *Explicit* knowledge. Tacit knowledge being all what we know but cant express. Explicit knowledge refers to knowledge that is transmittable in formal, systematic language (I. Nonaka, 1994)

Absorptive Capacity. Cohen and Levinthal gives a well cites and broadly used definition of absorptive capacity in their paper from 1990. They define absorptive capacity as: "A firms ability to recognize the value of new information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990b).

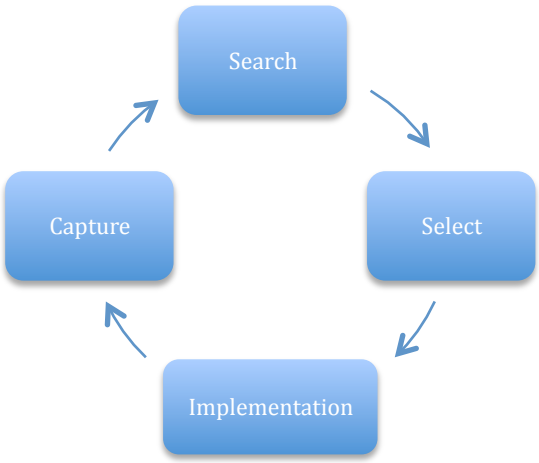
Innovation. Schumpeter broadly defined innovations as *"new combinations of existing resources"* (Jan Fagerberg, 2005).

Technology transfer. A specific knowledge-transfer process that depends on the ways firms and other institutions manage knowledge, in particular, their absorptive capabilities and their knowledge-transmission strategy (Amesse & Cohendet, 2001).

Innovation is a complex process involving many different aspects and phases. This gives a researcher the opportunity to study innovation processes from many different perspectives,

and to focus on distinct phases. To make it clear what the purpose of my thesis is I will clarify my perspective and angle of analysis.

Innovation can be simplified with a model describing it as a process of turning ideas into reality and capturing the value from them (Tidd & Bessant, 2009). This model can be described as a process consisting of four phases. First the search phase, then the selection phase, the implementation phase and lastly the capture phase. It is difficult to describe innovation as a linear process and that is also not the intention here. This model describes a circular process were each phase is mutually dependent of each other.



In my thesis I limit my study to the third phase, the implementation phase. Although the search, select, and capture phase are equally important for a firm to gain competitive advantage in the power utility industry I will focus on and analyze the implementation phase in this thesis. I will also highlight the relationship and discuss the influence on the implementation phase from the rest of the process. My thesis analyse the process of internalizing externally purchased knowledge and technology in a power utility company. This industry has not been subject to much research on absorptive capacity and technology transfer. My thesis is a single explorative case study with limited earlier research to compare the results with. Thus, any analytical generalization that can be made on technology transfer within the utility power industry will be limited.

Knowledge and Technology transfer

In this section I will give an introduction to theory used to explain mechanisms of knowledge transfer. Further, I narrow inn this broad theoretical field and present research on how companies internal and external knowledge transfer influence its innovation performance.

There is a widespread understanding in the literature of economics and management that firms exist because they are better than the market at knowledge transfer processes, and that this gives them a competitive advantage (Kogut & Zander, 1992). The established systems, routines and networks within firms facilitate knowledge transfer processes and thus firms are more efficient than the market. This argument is especially present in explanations of why Multi National Companies (MNC) exists (Minbaeva, Pedersen, Bjorkman, Fey, & Park, 2003). In the light of this realization purchasing knowledge and technology outside the boundaries of the firm would challenge a disintegrated and flexible R&D organization structure.

Research within the broad field of knowledge and technology transfer has been conducted with a number of different perspectives. This includes research on knowledge and technology transfer on a national level between developing and developed countries (Teece, 1977), knowledge transfer between universities, industry and government (Etzkowitz & Leydesdorff, 2000), between industries, between units and teams (Argote & Ingram, 2000; Grant, 1996; M. Hansen, 1999; M. T. Hansen, 2002; Kogut & Zander, 2003) and knowledge transfer between companies and organisations (Mowery & Oxley, 1996).

Research on knowledge transfer originates from studies on how firms best could accomplish successful international technology transfer (Cummings & Teng, 2003, p. 41). Early studies focused on resource cost of transferring know-how and further how this was reduced with increased experience (Mansfield & Romeo, 1980; Teece, 1977). As knowledge within this

theoretical field increased researcher started to focus on organizational structure and internal routines in firms. Early conceptual studies examined the administrative structure of knowledge flow to and from the rest of the company (Ghoshal & Bartlett, 1988; I. Nonaka, 1994; I Nonaka & Takeuchi, 1995). Further, the dominant paradigm in economic theory had emphasized allocative efficiency and price competition as the main drivers for economic growth. Joseph Schumpeter however argued that economic growth was rooted in technological innovations. This argument was picked up by several authors and the influence of R&D on firm performance was studied by many economic researchers (Kamien & Schwartz, 1982). During the eighties business researchers who focused on organizations, organizational learning and firm performance brought new perspectives into the literature on knowledge transfer. Wesley Cohen and Daniel Levinthal introduced the concept of absorptive capacity to this broad field of studies. The concept originates from literature within economic theory, mostly Schumpeterian theories, and examines the role of R&D in firm performance (Cohen & Levinthal, 1990b; Deeds, 2001). Cohen and Levinthal played a significant role within studies of firm's innovation performance. They where interested in firms innovation capabilities and how prior related knowledge influenced this, they argued that investments in in-house R&D improved a firms ability to recognize and exploit new external information (Cohen & Levinthal, 1989; Cohen & Levinthal, 1990b). To describe this ability Cohen and Levinthal developed the construct absorptive capacity. They emphasized the positive effects an in-house R&D department will have on a company's communication infrastructure both intra-firm and externally and thereby increasing the firms ability to absorb new information. R&D certainly brings benefits in terms of a more profound understanding of technologies by generating knowledge, routines and networks. However it is important to note that this does not automatically mean technological advance. Even though a firm can recognize, value and

purchase external knowledge it does not automatically mean they have the necessary method to bring it to commercial ends, exploit it and effectively establish a technological innovation.

I will go more in detail about the absorptive capacity construct later. However, the understanding that prior related knowledge as the determinant of firms absorptive capacity stood more or less solid (P. J. Lane et al., 2006) until two other American business researchers, Shaker Zahra and Gerard George, introduced the two sub-sets of absorptive capacity, potential and realized absorptive capacity (SA Zahra & George, 2002). After Zahra and Georges introduced these two sub-sets of absorptive capacity researchers has focused on identifying and operationalizing antecedents for these two subsets.

Justin J. P. Jansen, Frans A. J. Van den Bosch and Henk W. Volberda (2005) presented a paper built on the research done on combinative capabilities and absorptive capacity. They examined how common features of combinative capabilities affect dimensions of absorptive capacity. In this article these researchers focuses on organizational routines, systems and methods to improve the dynamics between and within units. They use the three distinct dimensions to describe influence on and antecedents of absorptive capacity.

Later studies on knowledge transfer has also examined inter-firm relationships, including knowledge transfers in alliance settings and from acquired units (Simonin, 1999). Outsourcing of R&D has gained interest (Balachandra, 2005), and this has increased the attention given to alternative ways of structuring the R&D organization. It is clearly a strong connection between the structure of an R&D organization and its ability to increase its innovation performance.

Absorptive capacity

To explore what facilitate and obstructs the internalization of externally developed knowledge in a power utility company I will employ the absorptive capacity construct presented by

Cohen and Levinthal. Today it is the most widely cited definition of absorptive capacity viewing it as a company's ability to value, assimilate and apply new knowledge (Cohen & Levinthal, 1990b). In order to increase innovation a company should expand its absorptive capacity. Cohen and Levinthal built much of their theory on literature from psychology and cognitive structures, and emphasized that the ability to adapt new knowledge depends on prior related knowledge. This perspective implies that companies with in-house R&D departments have a higher degree of absorptive capacity than others. This is also used as an argument to invest in R&D instead of simply buying the results or patent.

Cohen and Levinthal argument that a company's absorptive capacity is so strongly connected to its internal R&D investments didn't explain why some companies without R&D in-house departments, or any R&D investments at all, were highly innovative. As noted earlier this led to a review of the concept by the two American business researchers Zahra and George where they enabled a broader understanding of absorptive capacity. The researchers had to ask them selves the question of what made it possible for firms with traditionally understood low absorptive capacity to successfully internalize externally purchased knowledge. What were the factors facilitating and obstructing this process? To explore this Zahra and George introduced two new sub-sets, which they called potential absorptive capacity and realized absorptive capacity (SA Zahra & George, 2002). They distinguished four dimensions of absorptive capacity. These dimensions have divergent or overlaping influence on absorptive capacity, which in turn will be reflected in the innovation performance. These four dimensions are acquisition, assimilation, transformation and exploitation.

- Acquisition refers to the firm's ability to identify relevant external knowledge.
- Assimilation refers to the firm's routines and a process that allows it to analyze, understand and interpret the information received from the external source.

- Transformation refers to the ability to modify and adapt external knowledge and combine it with existing knowledge.
- Exploitation refers to the ability to transform this knowledge into a competitive advantage for the company.

The first two dimensions constitute potential absorptive capacity and the last two realized absorptive capacity.

Potential Absorptive Capacity

Potential absorptive capacity is the firm's ability to acquire and understand relevant new external knowledge. Firms acquire knowledge from different sources in their environment and the variety of these sources influences the firm's potential absorptive capacity. Exposure to knowledge per se does not guarantee a higher level of absorptive capacity. It has to be a shared or complementary knowledge as basis, if not assimilation of the acquired knowledge is difficult. Sharing the same cultural, academic, sector and firm background improves the knowledge transfer process. There is an extensive literature on context sharing and its influence on knowledge boundaries (Carlile, 2004; Grant, 1996; Kogut & Zander, 1992, 2003; I. Nonaka, 1994). Zahra and George also claim that experience will influence the development of a firm's absorptive capacity. A developed competence in how to search for knowledge as well as path-dependency will influence the firm's absorptive capacity (SA Zahra & George, 2002, p. 193).

Realized Absorptive Capacity

Realized absorptive capacity constitutes the firm's ability to transform and exploit new knowledge. In the transformation process the firm revise and combine new knowledge with existing knowledge, creating improved procedures, routines, technology and internal documents. In the exploitation phase the firm brings this added knowledge to commercial

ends.

Realized Absorptive capacity constitutes the ability to exploit the knowledge after it has been brought within the boundaries of the firm. This phase is also the main focus of my thesis.

How do Firms develop Absorptive Capacity?

Potential and realized absorptive capacities are two interdependent characteristics of firm's ability to internalize new externally purchased knowledge. How do firms develop these characteristics? In the introduction I described a few aspects that define our society, one of these was information and the accessibility of it. The other was the investments and growth of technological innovations within the energy sector. It is easy then to make the assumption that since there is a rich environment for sources of technological innovation all firms will find and make use of these. It's just a matter of how much capital you have and how many resources you can acquire. The reality of course is that firms differ widely in their ability to make use of these sources. It is in the strategic dimensions of the firm that the main differences are found. These are its managerial and organizational processes, its present position, and the paths available to it (Tidd & Bessant, 2009). The managerial and organizational processes are how the firm is run, or its routines, current practice and learning. Its present position is the current technology and intellectual property available to the firm, as well as its customer base and the relations to its suppliers. The paths available are the strategic alternatives that lie ahead of the firm. All these dimensions influence how the firm develops its absorptive capacity.

In the next section I will present theory used to explain firm's different capabilities and also how these can be managed to improve a firm's ability to internalize new knowledge.

Combinative capabilities

Frans Van den Bosch, Henk Volberda and Michiel de Boer argued that determinant or firms absorptive capacity could be extended to include more than the narrow focus of Cohen and Levinthal on prior related knowledge. They emphasized the influence of firms combinative capability (Van den Bosch et al., 1999). Increasing a firm's absorptive capacity is dependent on its ability to manage and optimize routines and processes in which it acquire, assimilate, transform and exploit new knowledge. This ability constitutes its combinative capabilities. In an article from 2003 Bruce Kogur and Udo Zander emphasize that new knowledge does not occur in abstraction from current abilities (2003). New learning, such as innovations, is rather a result of a company's combinative capabilities to generate new products and knowledge from existing knowledge (Kogut & Zander, 1992). In a widely cited article from 1997 David Teece, Gary Pisanoa and Amy Shuen (1997) also emphasize the importance of firm's abilities to exploit existing internal and external firm specific competences to develop wealth creation in regimes of rapid technological change. How to mobilize embedded knowledge within firms has been their main focus of research and firms do differ greatly on this capability.

To operationalize combinative capability the three researchers Justin Jansen, Frans A. J. van den Bosch and Henk W Volberda studied three major capabilities, Socialization-, System- and Coordination Capabilities (2005).

Each of these capabilities involves both potential (PACAP) and realized (RACAP) absorptive capacity variables. Optimalization of a firm's combinative capability is subject to the firm's ability to identify how its PACAP and RACAP could be adjusted and used most efficiently for the business environment or task at hand. Industry characteristics and knowledge attributes influence management of these two capacities independently.

1. Socialization Capabilities

How can a company's socialization capabilities facilitate or obstruct internalization of externally purchased knowledge? Socialization capabilities create a common understanding of appropriate actions and behaviour. Socialization capabilities are characterised by connectedness and socialization tactics within the firm. These organizational mechanisms refer to two aspects of social relations: the structural aspect, or density of linkages, and the cognitive aspect, or shared social experiences (Jansen et al., 2005). Connectedness improves trust and cooperation and thus increases knowledge exchange. Socialization tactics increases shared beliefs, values and needs. Employees are also introduces to a shared group- or unit-specific language. These aspects of a shared context improve transformation of newly acquired knowledge with the existing knowledge. Shared beliefs and norms results in enhanced commitment, and the process of exploiting externally purchased knowledge is improved. Building on the understanding of knowledge as tacit and explicit socialization capabilities can influence internalization of externally purchased knowledge. This capability can be even more important in knowledge transfer processes from external sources. The "not invented here" (NIH) syndrome[1] could be challenged with socialization capabilities.

2. Systems Capabilities

How can system capabilities facilitate or obstruct internalization of externally purchased knowledge? Systems capabilities program behaviours in advance of their execution and provide a memory for handling routine situations. This dimension is especially useful to explore internalization of externally purchased explicit knowledge. Formalization of rules, procedures, instructions and communication written or not sets the framework for how the

[1] Not Invented Here (NIH) is a term used to describe persisten social, corporate or institutional culture that avoids using or buying already existing products, research or knowledge because of their external origins.

firm functions. Routinization is performed to develop sequences of tasks that require relatively little attention and to ensure that inputs are transformed to outputs. Further, as Maryam Alavi and Dorothy E. Leidner show knowledge management systems (KMS[2]) can facilitate creation, transfer and application of knowledge in organizations (2001). Knowledge management system could play an important role in facilitating internalization of externally purchased knowledge, especially explicit knowledge.

These aspects of system capabilities can highlight how Statkraft manage to organize and utilize the explicit knowledge within its organization.

3. Coordination Capabilities

Internalization of new externally purchased knowledge can be facilitated by the company's coordination capability. In this section I address features of coordination in firms and knowledge diffusion. Although the knowledge-based literature has had limited impact on the analysis of coordination in firms (Grant, 1996), research into organizational learning and management of technology has explored the transfer and diffusion of knowledge within organizations (Kogut & Zander, 1992; I. Nonaka, 1994). Firms fundamental task is to coordinate the efforts of many specialist, without the efficiency benefits from specialization there is no need to organize multiple individuals in one organization. This is one of the main arguments from business and management literature on why firms exist (Grant, 1996). However, a knowledge-based view of the firm encourages an understanding of interdependence of specialists and tasks as an element of organizational design and the subject of managerial choice. Coordinating the knowledge within in a firm and utilizing it through methods like job-rotation and cross-functional teams can increase the coordination

[2] Knowledge Management System (KM System) refers to a (generally IT based) system for managing knowledge in organizations for supporting creation, capture, storage and dissemination of information.

capabilities of a firm and positively influence its capacity to internalize new externally purchased knowledge. Organization theory has focused on hierarchy as the basic structure for organizing complex social activity, and here cooperation or coordination is achieved through vertical imposed bureaucratic processes (Grant, 1996). However, a knowledge-based view of the firm brings in other dimensions of coordination and cooperation. Different projects and tasks have their specific characteristics and can diverge in how interdependent they are, this in turn influence the way they should be coordinated. This brings in a very different view of coordination in a firm compared to the earlier hierarchical organization theory focus. To enhance knowledge across disciplinary and hierarchical boundaries a firm is depended on good coordination capabilities (Grant, 1996). Firms differ in how loose or tight they coordinate their business. Some businesses need a tight coordination to be able to achieve their mission others need more loose coordination. The two researchers Tom Burns and George Stalker explored coordination in firms. They highlight that firms need to adjust to the technological and market environment they are part of and adjust their management processes and structure accordingly. They group firms into two main types, mechanistic and organic types. The former a more rigid and hierarchical type and the latter a more fluid organizations adapting to conditions of rapid change and innovation (Jan Fagerberg, 2005, p. 119). Like the Canadian writer Henry Mintzberg pointed out, different organizational archetypes each have distinctive implications on innovation performance (Mintzberg, 1979). For example, an organizational archetype Mintzberg classify as machine bureaucratic is very efficient in handling complex integrated processes, but it's a very inflexible system. Thus, innovation and rapid change are not part of its strengths. On the other end of Mintzbergs classification you have adhocracies that are characterized by high levels of creativity and flexibility. One distinct difference between Mintzbergs archetypes is the tightness of their coordination within the organizations. Loose coordination encourages creativity and flexibility, while tight

coordination encourages efficiency and stability (Tidd & Bessant, 2009). It is in this spectre where many firms who are striving to produce new technologies and be innovative struggle to find the best suitable combination of flexibility and coordination. On a managerial level the coordination dimension can be explored using cross-functional interfaces, participation in decision-making, and job rotation as features of coordination capabilities (Jansen et al., 2005). These mechanisms bring together a variety of expertise and improve communication and knowledge flows across functional boundaries and lines of authority.

In my thesis I explore the linkages between the organizational dimension of coordination and the managerial dimension. Accordingly coordination capabilities both on the organizational and the managerial level can facilitate and obstruct internalization of externally purchased knowledge.

Incentive systems

Internalization of externally purchased knowledge can meet several motivational challenges, the NIH syndrome is one of them. Using different motivational factors to create incentive systems for internalizing externally purchased knowledge might increase a firm's absorptive capacity. Literature implies that incentive systems are something to look deeper into (Jansen et al., 2005, p. 13). Internalization of new knowledge and learning, and especially externally purchased knowledge, is undeniably influenced by different layers of motivation. This is why I bring in motivation as a supplement to the dimensions included in the absorptive capacity construct. Incentive systems influence units and groups motivation to acquire and share knowledge (Gupta & Govindarajan, 2000). Large organizations have the propensity not to support rapid change. Large power utility companies that increasingly invest in new renewable energy technologies would be pushed towards organizational change when adjusting to the new business environment. This organizational change is not easily achieved without proper motivational factors and incentives for employees. Further, the act of sharing

knowledge with another individual, unit or team is also subject to different layers of motivation (Gupta & Govindarajan, 2000). Individual's motivation to share knowledge within an organization might be influenced by aspects like status, career possibilities and time. In studies on motivation a distinction is made between intrinsic and extrinsic motivation. Intrinsic motivation is the motivation of doing something because it is inherently enjoyable and interesting, extrinsic motivation is doing something because it leads to some kind of separate outcome (Ryan & Deci, 2000). Theories on motivation can help explain challenges involved with knowledge internalization and factors that facilitate and obstruct internalization of externally purchased knowledge.

Structure of the R&D organization

Cohen and Levinthal emphasized the importance of organizational mechanisms to improve a company's ability to absorb and internalize new knowledge, its absorptive capacity. R&D also played a major role in developing that capacity. Strategic management and R&D structure is thus important when exploring what facilitates and obstruct the internalization of externally purchased knowledge.

In the literature on knowledge transfer and technology transfer the structure of the R&D organization is emphasized as a distinct antecedent for a firms ability to internalize new knowledge. Cohen and Levinthal focused on internal R&D spending and organisation, others have focused on outsourcing of R&D (Balachandra, 2005), and companies organisation structure in general (I. Nonaka, 1994). Despite increasing levels of R&D outsourcing little empirical research has examined the effects on technological innovation performance (Tsai & Wang, 2009). Inward licensing is used in industries that are dependent on a flexible R&D strategy as a means to gain access to a number of different and varied technologies without the cost of a large R&D department (S Zahra, Keil, & Maula, 2005). This R&D organizational structure is seen in the power utility industry. Most of the literature on external

technology sourcing focus on how aspects of acquisition influence the firm, and on the choice between internal and external sourcing (Tsai & Wang, 2009). Internal and external R&D sourcing strategies are usually examined as two separate issues. Despite the fact that internal R&D improves a company's ability to internalize new information, studies focusing on a combination of outsourcing R&D and in-house R&D strategies are limited (Tsai & Wang, 2009).

However, it is clearly a strong connection between the structure of an organization and its capacity to increase its innovation performance. Communication between units, overall strategy and goal awareness is obviously easier achieved when the organization structure is tuned for this. And clearly R&D expenditure is not a direct determinant of absorptive capacity. The choices made by management of how to direct R&D expenditures and how to organize the firm plays a significant role on absorptive capacity and technological innovation performance (Zhang, Baden-Fuller, & Mangematin, 2007, p. 516) (Tsai & Wang, 2009).

Further, a centralized R&D structure may facilitate dense internal communication flows and thus, increase firm absorptive capacity (Cohen & Levinthal, 1990b; Zhang et al., 2007) However, decentralization can benefit loose coordination and thus initiatives from outside the established environment.

R&D can deepen or broaden the knowledge base of a firm. By continuing to hire people with similar competence as the existing knowledge base in the company the company deepens the knowledge within that field. It becomes even better at what it does already, but its absorptive capacity will not change substantially. However, by hiring someone with complementing competence the firm is broadening its knowledge base (Zhang et al., 2007) and increasing its absorptive capacity. Firm's R&D centralization can be viewed as a substitute for its knowledge breadth. This aspect is a dilemma subject to short-term versus long-term benefits

and rest on the firm's strategic choice to focus on the explorative or exploitative dimensions of learning. These two dimensions of organizational learning James March explores in his article from 1991 (March, 1991). March dimensions can be useful in exploring how the organizational dimension of learning can affect internalization of externally purchased knowledge.

Summary of theoretical framework

In this theoretical chapter I have presented several key theories on knowledge transfer processes. Before I move on to the methodology section I sum up the theories and arguments presented.

Literature on knowledge transfer and firms ability to absorb and internalize new knowledge is broad and involves many different perspectives on the process. Kogut and Zander as well as Grant points out that firms have a competitive advantage to the market in that they are better at knowledge transfer processes (Grant, 1996; Kogut & Zander, 2003). In line with an understanding of a knowledge-based economy Grant emphasizes the knowledge-based firm. In this context knowledge transfer processes becomes the key element for competitive advantage. My thesis focuses on firms in the power utility industry ability to absorb and internalize new externally purchased knowledge. Further, I present the absorptive capacity construct that is a frequently used construct to explain why firms differ in their ability to absorb and internalize new knowledge. To explain why firms who didn't have any R&D spending could be so innovative this construct was reconceptualised by Zahra and George who differentiate the absorptive capacity construct into potential and realized absorptive capacity (SA Zahra & George, 2002). This construct constitutes the base of my theoretical framework. Building on the absorptive capacity construct I present the capabilities firms have to influence these two sub-units of absorptive capacity. These internal processes are divided into socialization, coordination and system capabilities and according to the literature I base

my thesis on it is within these capabilities I will find most of the factors facilitating and obstructing internalization of new knowledge. Building on these theories I bring in theory on motivational factors and incentive systems. I finish of the theoretical chapter by presenting theory on R&D organizational structure that can help explain knowledge flow and coordination capabilities. The aim with this theoretical framework is to explore what factors facilitate and obstruct internalization of externally purchased knowledge. Incentive systems and the structure of the R&D organization are factors I expect can be relevant when exploring a firm's absorptive capacity

Before I move on to the empirical section I will describe my thesis methodology and research process.

Methodology

In this section I will give a brief review of the process of writing this master thesis, my empirical sources, my research design, the methods I used and why I chose them.

The method employed in my thesis is an explorative single case study of a power utility company highly dependent on externally developed knowledge and technology. The case analysed in my thesis is Statkraft, a Norwegian power utility company rooted in the hydropower industry.

I will describe Statkraft more in detail further down. With new technologies Statkraft has extended its scope of energy production methods over the last 10-15 years. Statkraft invest large amounts of resources to acquire externally developed knowledge and technology (Statkraft, 2008).

Why go for a case study?

In an early phase of a research process an explorative approach with a case study can be fruitful. A case study can give the researcher a wider insight in possible relevant variables and factors as well as test the strength and reliability of findings from quantitative analysis. The power utility industry has experienced rapid technological change and studies of absorptive capacity have not yet focused on this industry. A case study would thus give further insight in the factors that facilitates and obstructs internalization of externally purchased knowledge in the power utility industry. As described earlier I argue that the arguments in the current research of absorptive capacity should be extended to include antecedents from organizational structure of R&D. A case study is a great way to explore that statement.

Qualitative studies focus more on the "how" and "what" aspect than a qualitative study, that focus more on input and output indicators (Autio & Laamanen, 1995). Although quantitative studies focus on the future for investments, it is much more important to know how investments are used that to know how much of them is used. In the study of technology transfer and internalization of knowledge a qualitative study like a case study is a good research method since the focus of case studies are on "how" and "what" aspects.

Data collection

Establishing the first contact with Statkraft went surprisingly well. Through the Student contact at Statkraft I was put in contact with the Head of Innovation Projects (HIP) at the Innovation&Growth department. After a few short e-mails forth and back I was invited over to Statkraft headquarters in Oslo. We had an initial meeting were I presented my thesis outline and the ESST master program. The HIP also introduced me to her work, and it turned out that she was a great contact to have for an ESST student like me. A few days later I had a follow up meeting with the HIP and was given several pamphlets that presented Statkraft R&D strategy, as well as other internal strategies, mission statements and how Statkraft address innovation issues. I read them thoroughly and this gave me an initial understanding of Statkraft vision, strategic mission and work on innovation processes.

The Innovation&Growth department at Statkraft had just initiated an internal process of improving the internalization and diffusion of externally purchased knowledge and technology. The timing matched perfectly with the aim of my study and was important for the access I gained to the rest of the organization. This process was lead by the R&D Coordinator and Head of Innovation Projects at Statkraft. They included me in the internal processes straight away. A project group with five members both from the Innovation&Growth department and one other unit was established. The group included both male and female

members, with an average year-span. One of the members had worked at Statkraft for just about a year and the most experienced member had worked at Statkraft more than ten years.

During this process I was allowed to attend several internal meetings on the subject as well as included and participate in e-mail correspondences and review internal working documents. Two months after the first initial meeting I had at Statkraft, the project group lead by the R&D Coordinator and the HIP organized a workshop regarding implementation of R&D results were I participated as an observer. At the workshop a number of general managers and others involved with R&D at Statkraft were present, about 20 people. They represented a large part of the organization, and although I didn't get the exact firm experience level from participants my impression, after hearing their thoughts about working with R&D at Statkraft, was that the year span was from a few years to more than 15 years.

This explorative part of my research gave me a better understanding of whom I should interview, and which questions to ask. During the meetings, the workshop and the process as a whole I gained a thorough and broad insight in the organisation, I took notes and wrote a log of my thoughts during this process. The interviews gave me a lot of new insight in routines, communication flow and the challenges involved with purchasing technology and knowledge from external sources. However, by participating as an observer both at meetings, workshops and e-mail correspondence I gained a much broader insight into the organizations than I would have by just doing interviews. The main sources for this thesis are all the observations made during these four months as an included member and observer of the above mentioned project group. Some general questions regarding the role of a researchers acting as a participating observer can be made, and I will address these in the section on limitations and ethical concerns further down.

By conducting five open interviews with selected employees at Statkraft the more formal data collection procedure was carried out. I interviewed employees from different layers of the organization, including Project Managers, Vice Presidents to Executive Vice President level. The Executive Vice President of Wind power and Technologies, R&D Coordinator at Innovation and Growth, Senior Vice President at Innovation and Growth, Vice President Osmotic Power and Business Development Manager for Osmotic Power were all interviewed. All interviews were structured with an interview guide. The interviews were recorded and the respondents were given the interviews transcribed back for a read through and review. Some of the respondents returned the transcribed interviews with extensive comments and specification of arguments and thoughts. One respondent even asked for a follow up interview to clarify arguments and thoughts. Together with my contacts at Statkraft respondents were selected.

During the start up of this process HIP and R&D Coordinator at Innovation and Growth said that the Wind Business Unit had pushed a request for a new internalization method forward. HIP also emphasized the need for a diagnostic of how the organization was at that time. They expressed that they looked forward to draw knowledge from the thesis both on a specific case level, but just as much on a broader perspective level.

The meetings and the workshop had given me a good understanding of the general internal processes and methods common for the organisation. However, Statkraft has an ongoing project that stands out from the rest of their project, the Osmotic Power project, and I wanted to see if their internal methods and processes diverged from the rest of the organisation. I interviewed a small group of employees from that quite singular unit, the Osmotic Power Project. It is singular because the unit is much more involved in the development process and in interacting with the researchers

Osmotic power, freshwater and seawater are transported into separate chambers, separated by a membrane. The salt in the seawater then draws the freshwater through the membrane, causing the pressure on the seawater side to increase. This pressure corresponds to a water column of 120 meters, or a large waterfall, and can be utilized in a turbine to generate electricity. (Statkraft, 2009b)

than other projects or units in the organisation is.

After interviewing this group and gaining insight trough the meetings we had during the whole process I realized that the exclusive focus on internal routines and methods couldn't fully explain the innovation process. Informal talks and some of the interviews with respondents made me aware that the organizational structure of the R&D efforts could be just as important. At this point I had to restructure my research question to be able to include the framework of structure of the R&D organization.

To sum up this section I can say that the process from idea to finish included several stages of revising my perspective and angle of analysis. I gained access to much more data than expected and was included by two very welcoming representatives from Statkraft in an extensive internal process matching my thesis almost perfectly. However, there are some limitations and other concerns that should be addressed. I will do this in the following section.

Limitations and ethical concerns

During my interaction as well as in the writing process of my research I have paid special attention to the ethical concerns involved, and specifically those concerning case studies. The ethical guidelines for researchers given by The National Committees for Research Ethics has been very useful in all parts of the process ("Forskningsetiske retningslinjer for samfunnsvitenskap, humaniora, juss og teologi," 2010)

To be able to meet the challenges involved with generalizability of the case it has been especially important to place attention to theory in the construction of the research design, as emphasized by theorist within research design (Yin, 2009). Earlier studies of absorptive capacity and technology transfer have not focused much on power utility firms and the growth of the renewable energy sector. This makes my study relevant as an explorative case and at

the same time it puts limitations to the possibility of doing comparative analysis and building theory and arguments on earlier research.

The perspective of my research and my selection of sources should also be addressed. I study a transfer process of complex information, but I limit my selection of sources to those at the receiver end of the transfer process. This limits the conclusions I can draw on the interaction Statkraft has with their R&D contractors and on some of the social processes associated with the external linkages. This is not ideal, however my focus has been on the internalization phase of the whole transfer process, a wider approach would have limited the in depth knowledge I gained from just focusing on the purchaser end of the information flow. A study, which focuses on both ends of the information flow, would however give further insight in the relationship and implications of the strength of ties between purchaser and developer.

One major concern a researcher should have when employing a case study is the balance between deepening into the case to get the information needed, and keeping the distance needed not to be to much influenced of the challenges and environment you are stepping into. If the researcher gets too involved, the research and the observations made, can loose attention and focus. This can happen when the participant role requires too much attention relative to the observer role (Yin, 2009, p. 113). A threat to the validity of the researchers data in a qualitative study, like a case study, is that the researcher can impose its own beliefs and disregards discrepant data and alternative understandings or interpretations (Miles & Huberman, 1994). During my research I participated as an active observer and had to give special attention to challenges involved with this. With the famous descriptive case study *Street Corner Society* the sociologist William Foote Whyte (Whyte, 1993) became a pioneer in participant observation. One of the strong advantages with the participating observer method is the breadth of information the researcher gets access to over an extended period of time. Further, the researcher can compare the more conscious elaborated thoughts from

interviews with what actually is happening in the organization or group. However, as noted above there are several challenges involved with the participating observer method.

The research process involved several stages of revising my perspectives, extensive access to data compared to the size constraints and time available to develop a complete master thesis. I will now describe my research object Statkraft in more general terms and give an insight in its organization features as well as R&D strategies.

Statkraft. History and facts

History and market

Statkraft is a Norwegian state owned energy production company with long roots in the hydropower industry in Norway. Its business dates as far back as to the 19th century when the first hydropower stations were developed in Norway. Although a major part of the facilities and the business of the company existed at an earlier stage, the current company structure was first established in 1992.

From 1945 and in to the late 1970s a central strategy of the Norwegian government was to facilitate for the construction of energy intensive industries, like aluminium plants, and supply them with cheap electricity from hydropower plants. During this period there was an extensive hydropower development in Norway, both in the technology itself but also in the complexity of the systems. A number of key knowledge clusters[3] providing the technology to Statkraft brought Norway and Statkraft into a leading international position in hydropower technology.

Today Statkraft is Europe's largest producer of renewable energy with a total energy production of 56,9 TWh in 2009 and 3200 employees in more than 20 countries. Statkraft provides about 34% of Norway's electricity consumption (Statkraft, 2009a). Further hydropower development in Norway has been put on a hold after the Prime Minister in 2001 announced that "the time for large hydropower projects in Norway is definitively over" (Buch, 2001). To secure further growth within the renewable energy segment Statkraft has employed several new strategic initiatives. Wind and especially offshore wind, international hydropower and flexible power generation and market operations are the three new main

[3] Aker Kværner, Sintef.

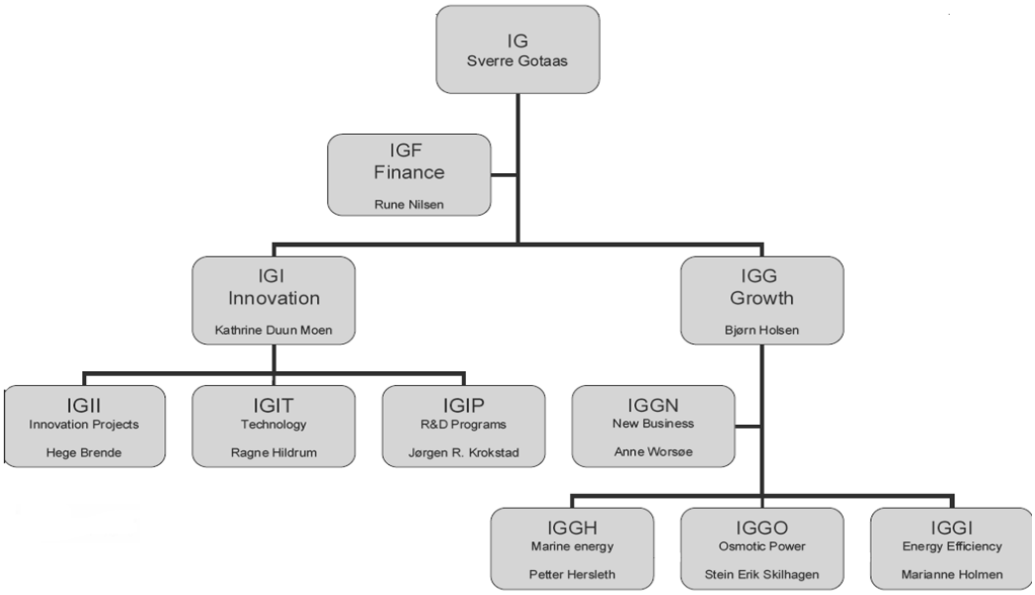
areas for growth. Hydropower still belongs to the company's core competence and according to an Executive Vice President at Statkraft it will continue to be their most important energy source for decades to come. However, if Statkraft wants to succeed within this fast growing industry (REN21, 2007) they are dependent on producing and securing technological innovations within a series of fields. Statkraft employees have a firm understanding of itself as a technology user, not a developer, however the company is annually spending 100-200 million Norwegian kroner on R&D (Statkraft, 2008). Further, external R&D contractors execute most of these projects. According to executive management at Statkraft this R&D model gives the firm a flexible and responsive R&D organisation.

Statkraft's organisation

To accommodate the increased growth and internationalization of Statkraft a number of business units were established in 2008. The aim was to achieve a more flexible and dynamic organisation were focus areas are highlighted and their results are more visible. In 2010 following the employment of the new CEO Christian Rynning-Tønnesen the organization structure of the Executive Management Team (EMT) was reviewed. The model presented below shows the new EMT structure.

R&D and Innovation at Statkraft

Statkraft has a designated innovation and growth department. The Innovation&Growth (IG) department mission is to optimize its R&D initiatives, increase its innovation performance, and exploit and capture values from commercializing technological innovations (Statkraft, 2009c). The model below shows the organization structure of the Innovation&Growth department.



The company has three strategic focus areas: international hydropower, wind energy in Norway, Sweden and the UK and the ability to operate flexible power generation. These strategic focus areas will require large investments in R&D for many years to come according to the Vice President of Technology and Wind Power at Statkraft. Further, Statkraft has three main initiatives to improve its innovation performance. Firstly it has a technology surveillance program that is to monitor new technologies in the renewable energy segment and technologies supporting renewable energy. Statkraft says it does so because it needs to keep up to date in a segment with wide-ranging and rapid advances (Statkraft, 2009d). The company is not only monitoring this segment it is also actively supporting research and development of renewable energy technology. It's R&D program is devoted to increase value

creation within the organisation. All R&D is done outside the company by different research institutions, universities and consultants. In house Statkraft has one Business Development Manager for each of its main R&D programs these are situated at the Innovation&Growth unit. This person monitor and evaluate the development and research done at the research cluster. The third area where Statkraft puts its attention is at New Businesses. Statkraft has a goal of entering into new market segments and uses the New Business program as a tool in that pursuit. The program is to search, find and develop early phase commercial opportunities. The power plant at Hurum producing energy using osmosis is one example from the New Business program. Statkraft is also heavily focused on Intellectual Property Rights (IPR) that it uses to secure it position and ability to operate in the market without major risks.

To increase managers awareness of innovation processes and project management Statkraft uses a management strategy called Innovation Agents. The programme aims to strengthen the culture for innovation and promote an innovation culture in the organization. Projects managers are trained to create an environment in the organisation that is able to innovate and is open to innovation.

In the next chapter I present and analyze my findings at Statkraft on factors that facilitate and obstruct the internalization of externally developed knowledge.

Empirical findings and analysis

My research has focused on a large power utility company's ability to produce technological innovations when it is highly dependent on externally purchased knowledge and technology. The core literature my thesis is based on comes from the literature on knowledge transfer and technology transfer. I did my research on the Norwegian power utility company Statkraft, which is Europe's largest producer of renewable power. At Statkraft I got extensive access to all parts of their organization and attended several internal meetings concerning improvement of internalizing of external acquired knowledge. However, as I described in the introduction innovation is a complex process constituting several phases. One of these phases at Statkraft has been subject to my focus and research.

In the following chapter I introduce the empirical findings from my research and time at Statkraft and link these up to the theoretical framework presented earlier. The theoretical framework employed in my thesis lays the framework for how I present my empirical findings. I present the findings from each theoretical dimension and within that dimension I analyse which factors facilitated and obstructed the internalization of externally purchased knowledge. I finish this chapter with a summary of the main findings at Statkraft. In the chapter following this analysis I discuss the theories I based my thesis on, how my findings corresponded with the theoretical perspectives and what implications they have on theories of knowledge transfer and absorptive capacity.

Statkraft potential absorptive capacity

To improve its ability to search for and select technological innovation Statkraft employs a few strategies concerning this issue. These are as earlier described the technology surveillance program, business development managers for its major R&D programs and New Business

program. The network Statkraft is part of with all the external R&D providers and the high skill level of their employees are the most important factors for it potential absorptive capacity. Statkraft is an organisation that most likely has a very high potential absorptive capacity. However, recognized by the managers and executives it comes short at the phase were all this new externally purchased knowledge is supposed to be absorbed and internalized. The company is apparently well prepared for technological innovations, with a highly skilled workforce and a competent research network, but it comes short on utilizing that innovation potential. To visualize the innovation challenge Statkraft is facing I want to share an allegory from James Brian Quinn:

"How does a firm manage in the new world? The best analogy is surfing. With many waves of change occurring at once, innovation surfers cannot be sure of riding the right one. So they position them selves where experience or intuition tells them many waves will be forming. They prepare themselves with the best equipment and training, including hundreds of hours studying waves and other surfers. They learn to discern a likely surfing opportunity from the sea's random motion, seeking waves that build on the energy of previous waves until they can tell that a really big one is forming. They may test a few. When a truly attractive wave starts to form, they speed into the curls and try to adapt quickly to each shift for a long, fast (profitable) ride." (Quinn, 2000)

My thesis focuses on the phase where the surfer is on the wave and adapting as fast as possible to the changes in the wave. The wave as an allegory for technology and knowledge. In this chapter I present the findings from my research on what facilitate and obstructs Statkraft's ability to internalize external purchased knowledge. Surfs up!

Statkraft historical background and market position

Statkraft has historically exclusively been an energy production company, and like one employee expressed it quite promptly "it's been about producing large quanta of electrodes and selling them". Statkraft is a technology user not a producer. This historical background

and core understanding of the company's role as a technology user has influenced the organizational structure as well as the focus given R&D at Statkraft. And thus, been an obstacle for Statkraft internalization of externally purchased knowledge.

Statkraft has defined their strategic focus areas and present these on their website. The areas Statkraft will prioritize in the future are its ability to operate flexible power generation, international hydropower and wind energy in Norway, Sweden and the UK. These business areas are founded in the firm's historical background and earlier path. Flexible power generation and focus on international hydropower are results of their roots in and competitive advantage from the hydropower industry. Wind power lies within the renewable energy segment and is in so far an available focus area according to their vision of meeting the world's need for pure energy. This influence its absorptive capacity in that way that knowledge within these areas are more effectively internalized than knowledge from other areas.

Statkraft's market position within the renewable energy sector is strong. It has a strong technological base within hydropower and construction of hydropower dams. Further, Statkraft has started to develop a technological base within wind power. The accumulated technological and intellectual property in the company is important to how the company can absorb and internalize new external purchased knowledge (Tidd & Bessant, 2009). It is within technologies from these areas that Statkraft has the best opportunities to internalize new knowledge and technologies. Further, the linkages with its current R&D suppliers and customers are connected to hydro- and wind power and as an electrical power supplier. Both the company history and its market position are important for the possible paths available and strategic alternatives.

Historical background and market position constitutes the context in which Statkraft develop its absorptive capacity. Today, Statkraft absorptive capacity is strongest within this context.

Within these areas Statkraft will most likely have more developed combinative capability that improves its ability to internalize new externally purchased knowledge. Efforts to increase its market position outside this context will presumably be more challenging.

Internal routines and systems affect the ability to internalize externally purchased knowledge. At Statkraft the boundaries between many of the units were strong, and the amount of interaction between the units and projects was limited. Most of the interaction between units and projects was a result of competence inquires at the service units. All three capabilities could be improved to exploit the full potential of all its units and accumulated knowledge.

I will now address the three capabilities highlighted in the theoretical chapter as dimensions of a firm's combinative capability and ability to internalize externally purchased knowledge.

Combinative Capabilities at Statkraft

The proposition that a company's combinative capability can either facilitate or obstruct its ability to implement externally purchased knowledge will be discussed in this section. I will discuss how the dimensions of combinative capabilities are used to internalize new knowledge at Statkraft.

Socialization capabilities at Statkraft and how it affects on company's ability to internalize new externally purchased knowledge will be highlighted before I present my finding of system- and coordination capabilities. These three sections will be followed by a summary of the combinative capabilities before I highlight antecedents from motivational factors and the structure of the R&D organization.

Socialization Capabilities

How can socialization capabilities facilitate and obstruct the internalization of externally purchased knowledge in a large power utility company? Statkraft is a company with many

highly skilled and educated employees. Its suppliers of R&D are surely skilled researchers and specialists. The challenge, like in most organizations, is to connect and utilize all this knowledge. In the following section I will elaborate on how Statkraft currently utilize the socialization dimension of its combinative capabilities. The main antecedents for socialization capabilities at Statkraft are strong and weak ties, density of linkages between and within units and time.

Strong & Weak ties

How strong or weak the ties are between actors in the network influence the knowledge search and transfer process as well as actors feeling of obligations towards each other (Argote & Ingram, 2000). At Statkraft, although they have several R&D suppliers, employees working with R&D projects expressed that they often used the same external contact or company.

"If you only have 10% of you available time devoted to R&D it is incredible comfortable to just talk with the guy you already know, it goes so much faster. You know each other, the language is familiar and the person delivers satisfactory results so why use more time on this? Why go to Germany or the UK to someone who provable, at least after academic merits, is better, more skilled and has worked more with the subject in question? You would need to establish a new contact, use time on it, the clock start ticking…"

For the individual at Statkraft who is purchasing R&D strong ties to a few external R&D suppliers have several advantages:

- The R&D purchaser can build upon an already established relationship.
- There is an overlap of shared context, thus informal communication is much easier established.
- The contact understands the firm's needs faster than new R&D suppliers and anticipate future R&D projects and initiatives needs.

- The whole administrative process of searching for a supplier and establishing a contract with the R&D supplier goes much faster.

There are a few suppliers that have stronger ties to Statkraft than other suppliers, these ties have developed over decades of development and collaboration within the Norwegian hydropower cluster. The Norwegian research centre SINTEF and the Norwegian University NTNU both have strong ties to Statkraft, they are both based in Trondheim. These ties limit the scope of perspectives of technological solutions and development that Statkraft is so dependent on. The strong ties with this knowledge cluster do however improve Statkraft's ability to internalize knowledge from these suppliers. The shared context and established relationship increase the probability of internalizing the purchased knowledge.

Time

However, although Statkraft often use the same group of R&D suppliers and researchers the potential in the relationships to these external sources are poorly exploited. Statkraft employees use many of the same R&D suppliers again more as a result of a wish to reduce the search process because of limited time available to use on following up an R&D project. No one really has enough time to follow up R&D properly and devote their time and capacity to exploit the full potential of the R&D effort. Like one informant stated the current situation:

”It is not so easy in a busy workday to get it spread out, maybe you’ll send the report to the neighboring office and so on, and you don’t think about that wind maybe has the exact same challenges as the ones on hydro have”.

New R&D projects are often initiated and pushed forward by their suppliers. Since the relationship with the old R&D suppliers is already established and there is a quite strong shared context, the suggestions coming from the suppliers are often quite relevant. It’s easy for a manager who knows he has a budget for R&D, but not really enough time to search for good R&D projects to fall in with suggestions like these. This results in an unintentional

bottom-up R&D strategy, and less control with the mechanisms that influence the innovation process. Limited time obstructs socialization capabilities and thus internalization of externally purchased knowledge.

Density of linkages

Like I described in the theoretical chapter sharing knowledge within the organization is also influenced by the density of linkages employees have within the firm. Boundaries between units and groups can stop diffusion of new knowledge. If a firm is characterized by high internal density of linkages it is more probable that new knowledge will diffuse to the rest of the firm through social mechanisms. When talking with employees at Statkraft and also during the workshops and meetings I participated at I got the impression that the density of linkages between units is not very high. Like one informant expressed it on a question on inter-unit communication:

"In general I would say that it's too little. It is something we want to increase regarding diffusion of results, and that people manage to see beyond these "pillars", the different business units and service units."

The boundaries and low level of linkages between units obstructs socialization capabilities and thus internalization of externally purchased knowledge. However, there seems to be a quite high level of linkages within units facilitating socialization capabilities and internalization of knowledge. A more in depth study of linkages within and between units in necessary to gain a broader understanding of the effects of the boundaries within the company.

Time, external linkages and boundaries within the company

One of the main challenges Statkraft has when striving to create technological innovations is the lack of time managers have to focus on R&D and the R&D suppliers. The social potential that is embedded in linkages to external sources is not very well developed. The linkages

Statkraft have with external R&D suppliers and the collaborations with universities were expressed to have a strong potential. However, PhD scholars, graduates or R&D suppliers were not obliged to hold lectures or presentations of their work at Statkraft. This was a potential many employees emphasized, however it was also expressed that it is a challenge to bridge the gap between the academic context researchers are working in and the context employees at Statkraft work in:

"(...) To link a master student, or a PhD student, that has studied for many years and specialized inn an academic problem, and has a language and way of working matched to an academic organization, to someone who has a specific problem. This person is more concerned about solving this problem and wont follow the person on the other side of the table if that person goes off in an academic direction elaborating about possibilities lying long distances ahead. This is were we have a gap"

This makes it difficult to relate researchers work to the reality and tasks employees at Statkraft face. Nonetheless, aspects of utilizing the socialization capabilities potential from the external linkages were not very well developed. Another informant was asked if external R&D providers had presentation of their work at Statkraft.

"Yes, it happens. We can be much better at this though, to require that included in the project it follows a presentation at completion. Not just the report".

My experience during my observation at Statkraft was that this potential was limited utilized. Weak utilization of linkages as well as time available for managers to spend on R&D and its suppliers can influence a development of strong ties within the business units and the firm. This might result in a more narrow perspective when searching for solutions in a problem-solving situation at Statkraft. The firm it self becomes introvert and solutions are looked for mainly within the firm or even within the specific unit. However, strong ties improve transformation and internalization of new knowledge (Jansen et al., 2005). An increased mutual obligation between the receiver and supplier can increase the frequency of

communication between the two parties. There is undoubtedly a connection between the amount of external linkages, the strength of internal and external ties on one side and the explorative and exploitative perspective on the other side. The balance between these is highly important for a company as dependent on technological innovations as Statkraft is. Further, the boundaries between the different units are quite present. Statkraft did not pursue any official socialization tactics, other than that those employees that are part of different R&D projects or programmes occasionally have presentations of current technology development for employees from other part of the organization. On the access to a social experience-sharing arena one informant answered:

"There are few official networks in Statkraft that you collect together with regular intervals to share experience with. That does not only concern R&D, it applies to everywhere you look. This is something that more or less follows free associations. You talk with those you already know. It is a big potential for improvement on this issue."

A well working social arena where employees from different units can meet and share experience and thoughts is missing. This obstructs the internalization of externally purchased knowledge.

To sum up the findings of antecedents of socialization capabilities at Statkraft strong ties with the knowledge cluster providing R&D improved Statkraft's ability to internalize knowledge from these suppliers. Limited time available to follow up R&D projects and low level of linkages between units obstructs internalization of externally purchased knowledge. However, high level of linkages within units facilitated internalization of new externally purchased knowledge.

I find it natural to discuss the relationship to its biggest external supplier of knowledge within the section focusing on socialization capabilities. This relationship is highly relevant to my

thesis since this relationship has dimensions that overlap with organizational and coordination dimensions.

SINTEF and Statkraft

SINTEF is a major supplier of R&D projects to Statkraft and it was expressed by employees at the Innovation&Growth department that communicating with them was easy. SINTEF has strong ties to employees at other business units as well. On many occasions the offer of starting up a research project on a topic or a smaller R&D contract came before Statkraft had made the decision or maybe even seen the need for an R&D initiative. SINTEF employees know what Statkraft is working on and can anticipate upcoming R&D needs. In many cases they sell inn R&D projects to managers at Statkraft before Statkraft identifies the need them selves. So again, by going back to what the researchers Jansen et al. describe as shared social experiences (2005) this aspect is very present in this relationship. Context sharing is a significant aspect in knowledge transfer processes (Kogut & Zander, 2003). I will not go into detail about the mechanisms and studies done on shared context. However, this aspect is strongly present because many employees at SINTEF and Statkraft have similar education, maybe even from the same universities and share the same national and cultural experience and there is a presence of employee transition between the two organizations. They share boundaries in the same technological cluster. On that side SINTEF has a strong competitive advantage compared to potential international R&D suppliers. This shared context facilitates internalization of knowledge purchased from SINTEF. On the other side the relationship and the strong ties between them narrows in the search scope at Statkraft.

The Innovation&Growth department at Statkraft has realized that there are challenges involved with the relationship to SINTEF and has increased the focus given to identify research centres in Europe and other part of the world that could compete with SINTEF.

The relationship with SINTEF showed how strong ties to R&D suppliers and opening up access to projects can positively increase input of new perspectives to technological development. The R&D propositions from SINTEF have been valuable for Statkraft. Although I am not aiming to analyze the impact of this relationship it is quite clear that this dynamic in the connection with R&D suppliers shows that companies who relying heavily on external purchased knowledge need to balance between strong ties, openness and the ability to find and choose new R&D suppliers. Using Quinn allegory again, managing to balance on this knowledge wave would facilitate the internalization of externally purchased knowledge.

System Capabilities

When studying the system capabilities of Statkraft I examined to which degree they had formalized procedures, routines, communication and instruction. I also looked for both formal and informal routines. The system capabilities of a firm is supposed to provide a memory for handling routine situations as well as program behaviour in advance of their execution.

Existing knowledge within the firm, like procedures, instructions, communication and reports, can be made accessible for the entire organization by internalizing these in knowledge management systems (Alavi & Leidner, 2001). Formalization improves a firm's realized absorptive capacity (Jansen et al., 2005), that is the exploitation and internalization of acquired knowledge.

Formalization of rules, procedures, instructions and communication written or not sets the framework for how the firm functions. At Statkraft there is an established formalization of how projects are supposed to be executed. However, projects are in many cases executed and managed differently. Projects lack a formal coordination and experience-sharing arena. To be able to learn interunit and –group there needs to be an arena where members can share knowledge and experience from their projects. And not only when they are finished. The

formalized project management tools available are more sporadic used, depending on what's normal in each business unit. The current knowledge management systems are not functional or easily accessible. During the workshop I attended as an observer some of the employees expressed that they did not use any of the knowledge management systems available in the firm. Not having enough time to fill out and upload reports and project was expressed as one factor. However, motivation to share knowledge and knowledge about what kind of information that should be shared can be other underlying causes. Motivation is an important aspect to consider when analyzing knowledge sharing and transfer I analyze and discuss this issue later on.

The lose formalization of routines and other procedures results in a lack of overview of finished and current R&D projects. Sharing knowledge and using any of the developed knowledge in the organization becomes difficult. This is supported by earlier research (Jansen et al., 2005). Within the system capabilities a lack of a good knowledge management system seems to be the main obstacle for internalization of externally purchased knowledge.

Coordination Capabilities

At Statkraft the features of its coordination capabilities that facilitate internalization of externally purchased knowledge is most likely to be found in the areas where the company has its core competence. The hydropower division of the company is influenced by a rather stabile and predictable environment, in this environment a mechanistic organization structure will be a feasible coordination strategy (Burns & Stalker, 1994). This organization structure facilitates internalization of incremental innovations,[4] which are typical features of a well-developed technology like hydropower. Statkraft is an organization that historically, both

[4] Freeman and Perez has a good taxonomy of different types of innovations. Incremental innovations are smaller improvements of existing technology. Radical innovations are innovations that bring structural change (Freeman & Perez, 1988).

because of its business nature as mainly a producer and provider of electricity and its publicly ownership, is located strongly on the mechanistic side of Burns and Stalkers dimension (Burns & Stalker, 1994). Within the new strategic focus areas Statkraft meets an environment with a lot more uncertainty and more rapid technological change. The units working within these areas face a bigger challenge, and here the coordination capabilities seem to be poorly adjusted. In this area it could be wise to look at Mintzbergs archetypes (1979) and loosen up the hierarchal dimension of coordination. During my observations my experience was that the organizational features of the units within these areas were quite similar to the units with more established and predictable technologies like hydropower. More fluid membership in groups and utilizing experts in several organizational roles and teams would make these units better prepared for rapid technological change and technological innovations (Burns & Stalker, 1994; Grant, 1996; Mintzberg, 1979). Increased awareness of coordination capabilities at Statkraft would not only be a strategic advantage as a result of improved capability to create technological innovations within these new areas, but it would also increase the diffusion of knowledge through the social dimension that follows good coordination of units, teams and experts. In this way the coordination and socialization capabilities overlap each other's influence. This is an example of how an organizational antecedent can enhance performance of dimensions on the managerial level.

One strategy regarding coordination in knowledge intensive firm's is instead of training employees to deepen in specialist skills firms increasingly go towards cross training and job rotation (Grant, 1996). This will increase common knowledge on the cost of specialized knowledge, however in the trade off against decreased specialist knowledge it is believed that this will enhance organizational capabilities. The findings from Jansen et al. research supports this assumption (2005). Within the new strategic focus areas this could be a possible organization structure. The Innovation&Growth department is unit that focus on that issue. At

the more specialized business units it seemed liked the focus was more on deepening in specialist skills.

Team-based structures where team membership is fluid, depending on the knowledge task at hand is a recognition of that coordination is best achieved through the direct involvement of individual specialist and that specialist coordinators cannot effectively coordinate if they can't understand the essential specialist knowledge. The complexity of the purchased knowledge or technology will impact this issue as well. This is fundamental to Mintzberg theories as well. A large organization needs to find the right place for a task and organize its specialist so that they can either innovate properly or be effective and consistent (Mintzberg, 1979). Further, Grant emphasize that if movement of knowledge within the organization requires the movement of the specialist who possess it, then effective knowledge exploitation will involve that these individuals occupy multiple organizational roles and membership of multiple teams (Grant, 1996). There are a few employees at Statkraft that are so highly skilled and experienced that several project managers want them in their team. Grants assumption and Minztberg's theories would be effective at Statkraft. These specialists should be utilized to share specialist knowledge and experience between project groups and units. Coordination of teams, specialists and the organizations structure influence a company's ability to internalize externally purchased knowledge. Job-rotation is an antecedent of coordination capabilities, the presence of this antecedent at Statkraft was expressed by an informant with these words:

"It is often spoken in big words about that job-rotation is a good thing. But I mean there is no one who wants to let go of their staff. I guess people are holding on to their unit's staff".

I have little trouble to understand that units wants to keep hold of their staff, they are valuable human resources and can be highly important specialist. Job-rotation and cross-functional teams was not uncommon in the Innovation&Growth department, which was the most cross-functional unit of the organization. In this unit many of the employees had worked in other

parts of the organization or in other companies. Project teams usually constituted team-members with a variety of specialization and experience. This improves the Innovation&Growth unit's ability to identify the challenges other units face, but to facilitate internalization of purchased knowledge in the other units the coordination capability might need to be improved.

The historic background of the company and the firmly based understanding of the company as a technology user influence they way the whole company is organized. This historic background and collective understanding is one of Statkraft's organizational antecedents. This lays the foundation for a high exploitation of what Statkraft already does well, and an organization that facilitate internalization of externally purchased knowledge that results in incremental innovations. At the same time the historic background is an obstacle for new organization structures and thus dimensions of it coordination capabilities. This can limit Statkraft's ability to internalize externally purchased knowledge from new technology areas. Antecedents on the managerial level with cross-functional teams and project groups are also relevant in this analysis. The highly skilled and experienced experts are not been utilized efficiently in multiple organizational roles and teams. This obstructs the internalization of new externally purchased knowledge.

The Innovation and Growth department has a coordination responsibility regarding purchase of externally developed knowledge. In the Innovation and Growth section in the next chapter I highlight issues concerning its mission, mandate and capabilities.

Organizational and managerial dimensions: a summary

I will briefly highlight how the organizational and managerial dimensions have influenced Statkraft's absorptive capacity.

Statkraft's market position within the hydropower and wind power industry might facilitate a more effective internalization of externally purchased knowledge from these areas, thus increasing its absorptive capacity. Within the socialization capabilities Statkraft strong ties to its major R&D suppliers improved Statkraft's ability to internalize knowledge from these suppliers and this contributed to an improved absorptive capacity. However, Statkraft's historical background has influenced the understanding of its role as a technology user. This in turn has influenced the organizational structure as well as the focus given R&D at Statkraft and been an obstacle for organizational change and effectively internalization of externally purchased knowledge from insecure market environments, like new technology areas. The lack of focus given to R&D was quite clear when analyzing it socialization capabilities. With limited time available to focus on R&D projects and few linkages between units internalization of externally purchased knowledge became difficult. The system capabilities were strongly affected by the lack of a good knowledge management system, this would most likely decrease Statkraft's absorptive capacity. After analyzing the coordination capabilities it seems to be a clear gap between the mission given to the organization and the coordination of the resources both on the organizational and at the managerial level.

To analyzing Statkraft's absorptive capacity using theory on combinative capabilities highlighted some deficiencies of antecedents used to measure absorptive capacity. I explore the variable time as an antecedent for absorptive capacity in the next section. Further I finish the analysis by exploring the influence the structure of the R&D organization has on Statkraft's ability to internalize externally purchased knowledge.

Incentive systems

Statkraft did not have any formal incentive systems to increase its capacity to internalize new knowledge faster. I did not identify any hiring strategies rewarding PhD, MBA or equivalent titles, at least none of my informants knew about a hiring strategy rewarding high competence

workers. Statkraft also lack a reward or incentive system to support employee's knowledge increase, employees complementing their education or taking relevant short courses. Incentive systems for knowledge sharing within in the organization was also absent. By not having any formal incentive strategies Statkraft is not utilizing the extrinsic dimension of motivation. Another overarching dimension that influence the efficiency of incentive systems is time. To build on intrinsic motivation employees could be given a certain amount of hours per week they could devote to personal knowledge and competence improvement that is relevant for Statkraft. This could also be complemented by a more organized knowledge and experience-sharing arena like seminars, working groups and lectures within different areas.

The lack of incentive systems obstructs internalization of new knowledge. This applies to internalization of externally purchased knowledge, existing internal knowledge and increasing the personal skills of employees.

Structure of R&D organization

As I described in the theoretical chapter the literature on outsouring of R&D and its affects on absorptive capacity is limited (Tsai & Wang, 2009). I have explored a company where the R&D organization is disintegrated from the rest of the organization and structured to enhance flexibility. In this section I analyze how the structure of R&D organization at Statkraft affects their ability to internalize externally purchased knowledge. This is an overarching dimension influencing all parts of the internalization phase.

During my time at Statkraft several lower level managers as well as people from the top management emphasized that the R&D effort hasn't been given good enough attention and is not reflecting the visions presented in its R&D strategy. R&D projects has been something project managers could coordinate on the side of other more demanding projects. Throughout the organization there was a shared understanding that something had to be changed, the

R&D efforts and the development of technological innovations at Statkraft was not good enough. A short reference to one informant commenting on the current R&D structure pinpoints this understanding quite well:

”No, its way too expensive and very ineffective”

The initial perspective of my thesis was on internal routines and systems. However, the structure of the R&D organization and the R&D strategy is off course interdependent with the internal routines and the systems needed. By interviewing part of the top management at the Innovation&Growth department and at the Executive Management I learned why Statkraft had chosen the structure of its R&D efforts and how they organized it. Executive Vice President in Wind Power and Technologies response on a question regarding an in-house R&D department was:

”I don’t think that is advantageous. I believe its way too expensive. I think it will be too static, because the world changes and you have to have different types of competence spread over a timeline. If you build up this by your self you’re getting limited flexibility, it takes longer to turn the ship around.”

The structure of the R&D effort is obviously based on the strategic focus on flexibility, but the organizational attributes of the current R&D structure made communication and efficient technology development difficult. Managers who have R&D as part of their responsibility has to prioritize their focus between more daily general routines and R&D projects. In that situation R&D projects lose, and the R&D efforts will not be efficiently executed and new knowledge will not be internalized as it should be. Time is undeniable an essential factor. Management of R&D is included in some positions, but in the business units they are never exclusively focused on R&D.

Statkraft has a disintegrated and flexible R&D organisation. Most of their R&D spending goes to external contractors, which makes the organization flexible and able to change course

and focus fast. In an environment were radical innovations could change the market and Statkraft position could be fundamentally changed this strategy can be reasonable. To adjust to the different attributes of technological environments Statkraft is doing business in they could separate the structure of their R&D organization accordingly. Further, as I have pointed out earlier several authors emphasize that the advantage firms have to the market is that they are better at knowledge transfer (Grant, 1996; Minbaeva et al., 2003). By using mostly external sources for R&D the internalization phase at Statkraft is challenged. Therefore, to be able to outweigh that challenge special attention and resources should be given to the internalization phase of the knowledge transfer process.

I discussed Statkraft relationship to SINTEF earlier as a factor influencing its socialization capabilities. However, because of SINTEF's dominant role as a supplier of R&D to Statkraft it is also relevant to discuss the relationship within the context of R&D organization structure. I will discuss that relationship and how it can both facilitate and obstruct the internalization of new externally purchased knowledge. Strong ties can diminish access to other perspectives and solutions to technical challenges. In size an in-house R&D department needs to exceed a critical mass of employed researcher to be able to achieve the research variation needed to be a strategically efficient tool. This is off course a question of finance and strategy. However the limited size of a financial feasible R&D department at Statkraft is, according to employees at Statkraft, one significant reason for why they have chosen not to establish one. Statkraft R&D initiative is disintegrated, its not part of the internal organization and structure. For the firm to be in line with the overall R&D strategy where flexibility is a stronger priority over an in-house R&D department, it’s important that SINTEF does not become a substitute for an in-house R&D department. In such a situation all the challenges of purchasing knowledge from external sources follow together with all the implications of transferring knowledge and

technology into an organization. As Bill Joy emphasized ”most of the best brains work for some one else”, but most likely they do not all work for SINTEF.

Main findings

To answer my research question “what facilitates and obstructs the internalization of externally purchased knowledge in a large power utility company?” I will briefly conclude the main findings at Statkraft.

The organizational features of Statkraft, its historical background and market position influenced its ability to internalize externally purchased knowledge indirectly. The historical background obstructed organizational change. However, it facilitated incremental innovations within those areas were it had its roots, hydropower. Internalization of knowledge purchased from technology areas outside its core business might be obstructed. Its market position made it easier to make use of the knowledge purchased from the Norwegian research institute SINTEF. The strength of ties had significant influence on both the socialization capability as well as the coordination capability. The socialization capabilities were important capabilities to internalize especially tacit knowledge and seemed to be a very important capability in a company that is operating in an environment with rapid growth and technological change. Coordination was also a major factor in internalizing knowledge. This ability was very important both at the managerial and at the organizational level, and motivational factors might have influenced this capability quite strong. Time was an important factor for managers’ ability to utilize the potential they had in coordinating internalization of new knowledge. Time was also an evident factor in the knowledge sharing and competence improvement of employees. I would say that time can be recognizes as the overarching factor that was given the least priority in both the socialization and coordination capability.

In the next chapter I will discuss what implications for theory about knowledge transfer and absorptive capacity my findings have. Further, on the side of the theoretical discussion I also discuss the role of the Innovation&Growth department in the discussion chapter.

Discussion.

In this chapter I will briefly discuss the implications my findings have for theory on knowledge transfer and the theoretical discourse about antecedents for a firms absorptive capacity. The relevance of the two dimensions introduced by Zahra and George in their review of the absorptive capacity construct will also be highlighted. Further, antecedents used by the researchers Jansen et al. for the different capabilities constituting a firms dynamic capability and its influence on absorptive capacity will also be discussed. I discuss how the

In literature about knowledge transfer it has been emphasized that firms are better than the market at knowledge transfer processes, and this implies greater challenges when internalizing knowledge from external sources. My findings support this assumption.

The absorptive capacity construct was very useful when studying the internalization process at Statkraft. The division of the construct into potential and realized absorptive capacity by Zahra and George (2002) makes it easier to measure and recognize where the challenges of internalizing externally purchased knowledge is found. The proposition pointed out by earlier researchers (Van den Bosch et al., 1999) that the ability to internalize externally developed knowledge is not only determinant by prior related knowledge as Cohen and Levinthal argued (1990b), but also influenced by the company's ability to utilize its organizational and managerial opportunities is supported in this case study.

The antecedents for combinative capabilities used by Jansen et al. in their article (2005) where all very useful to explore managerial factors of the knowledge transfer process. All three capabilities were explored on the managerial level and I found these theoretical tools very useful. The organizational antecedents used in my thesis expanded the analysis to include multiple levels of analysis exploring both the individual-level as well as the

organizational-level. Although this increased the complexity and variation of the antecedents it was useful for the explorative case study I employed. The findings from my research object were that organizational antecedents influenced the managerial antecedents. This was especially evident within the socialization and coordination capabilities. Managerial antecedents like cross-functional teams and density of linkages were dependent of the organizational antecedents. Particular organizational antecedents, like R&D structure or time, might enhance all managerial antecedents and increase absorptive capacity.

The researchers Jansen et al. emphasized that coordination capabilities primarily enhanced potential absorptive capacity (Jansen et al., 2005). In my study I found that the coordination capabilities were important factors in the internalization of externally purchased knowledge, which is part of the realized absorptive capacity. This finding can be explained with the combined or moderating effect of organizational antecedents. Further, as they mention in their article incentive systems could be a possible antecedent for combinative capability and thus absorptive capacity. During my research I explored if motivational factors, like incentive systems could be relevant antecedents to absorptive capacity. Since Statkraft did not have any incentive systems to improve internalization of externally purchased knowledge I wasn't able to get any empirical evidence from this case study. However, my experience from Statkraft was that both intrinsic and extrinsic motivational factors had some degree of influence on knowledge transfer processes, organizational change and managerial dimensions. For instance incentive systems might enhance the frequency of job-rotation. This is not new to the literature of knowledge transfer, however as motivational factors seemed to influence the socialization capabilities on the managerial level and the coordination capabilities on the organizational level incentive systems might be good antecedents for both levels of analysis. Motivational factors, like incentive systems, can be useful to explore for future research on antecedents of absorptive capacity. Further, bringing in historic background and market

position of Statkraft undoubtedly facilitates a more profound understanding of the context and strategic potentials of its absorptive capacity.

Innovation&Growth

Statkraft like many other firms has established a designated department for innovation processes. In an environment of high technological development and change it can be reasonable to focus on innovation performance. Designating a whole department to increase innovation performance is not uncommon in large firms. Without having any other empirical evidence to back up my arguments than my limited observations from a few larger Norwegian companies during my studies I humbly share my thoughts on "Innovation departements".

Innovation is in its core sense a result of variation, organizations however strive to limit variation. This is one of organizations core tasks, hence their focus on routines to increase efficiency. To illustrate this I site one of the lecturers from my master programme Tian Sørhaug: "Organizations don't learn, they have learned"(Sørhaug, 2010). Following this understanding of innovation an innovation department should be given a mandate to allow variation, and combine knowledge in new combinations. However the real dilemma for executives comes when the innovation department need to invest.

In management and organization issues, one of many challenges for units and leaders can be that the mission they are given cant be achieved with the resources and authority available to them. In my thesis I have tried to give you as a reader a wider understanding of the complexity of innovation processes and especially knowledge and technology transfer processes. As I have shown in this thesis innovation capabilities involves the firm's socialization capabilities, system capabilities as well as coordination capabilities. I have also discussed how other dimensions of the firm, like company history, market position and other organizational antecedents influence the innovation capabilities of a firm. However, when

establishing a department whose aim is to increase the firm's innovation performance, the appropriate authority and mandate within these areas should follow. This is a quite bold statement. As any scholar of innovation studies would agree this not easily achieved, this would require mandate within dimensions so widely different as team-decision making, socialization tactics, corporate organization structure, market positions and relationship to suppliers. Obviously, one unit or department alone can't achieve these goals. To increase an organizations innovation performance the whole organization needs to accommodate the managerial and organizational dimensions that facilitates an innovative organization.

At Statkraft their dilemma is based in the balance between exploiting the technological advantage they already have and daring to go beyond the big words in their R&D strategy and give the explorative dimension of R&D grater focus. The historical background of the organization as well as the rather safe environment, both financial and technological, Statkraft face in the hydropower market may work as a false security. To secure its position as Europe's largest producer of renewable energy in the long run the company must take a giant leap and dare to invest more in the explorative part of its business.

Conclusion

My thesis explored factors influencing internalization of externally purchased knowledge at the Norwegian power utility company Statkraft. I use the absorptive capacity construct introduced by Cohen and Levinthal (1990b), later revised by Zahra and George (SA Zahra & George, 2002) into two separate capacities, and combinative capabilities to explore the process of internalization of new knowledge at Statkraft. Cohen and Levinthal argued that prior related knowledge was the determinant for absorptive capacity, the researchers Bosch et al. argue that the firms ability to manage at optimize its internal routines and capabilities was a determinant for absorptive capacity. Further, Jansen et al. (2005) explored several managerial antecedents for these routines. By studying both organizational and managerial antecedents for combinative capabilities and thus absorptive capacity I made some interesting findings.

I conducted a explorative case study and as an participating observer at Statkraft I got extensive access to internal processes, meeting, workshops, e-mail correspondences, interview objects and documents over a period of four months.

My study is an explorative case study and thus generalization of my findings might be limited. However, the main findings of what facilitated and obstructed internalization of externally purchased knowledge was found both in the managerial- and in the organizational dimension. On the organizational-level the bureaucratic characteristic of the organization facilitated incremental innovations in the established technological market hydropower, but it indirectly constituted a major barrier to internalization of knowledge from new technological areas. On the managerial level, the lack of a good knowledge management system obstructed internalization of externally purchased knowledge. Further, within the social- and coordination – capabilities the managerial antecedents explored earlier (Jansen et al., 2005)

where highly relevant. However, my study showed that by analyzing a firms ability to internalize new externally purchased knowledge with both managerial-level antecedents and organizational-level antecedent a more profound understanding of the complexity of this process became visible. The organizational dimension had especially influenced Statkraft socialization- and coordination- capabilities on a managerial level. Further, I explored the relevance of incentive systems and time. Both these two antecedents where highly relevant on both the managerial- and organizational level. With this research I built on earlier research and showed that organizational antecedents influenced managerial antecedents. Further I also showed how organizational antecedents can enhance all dimensions of absorptive capacity. Future research on motivational factors and incentive systems might show how this antecedent can enhance all dimensions of absorptive capacity

My findings that organizational antecedents might have a strong influence on managerial antecedents can be interesting for the perspectives of organization and strategy research. However, I must stress that this thesis is an explorative case study and thus generalization of my findings should be limited to similar organizations in the power utility industry.

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